

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 24

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte YUICHI KASHIMURA, YUTAKA TAKAKU, and TOSHIO ISHII

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Appeal No. 1997-1071  
Application No. 08/350,119<sup>1</sup>

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HEARD: September 15, 1999

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Before KRASS, MARTIN, and GROSS, Administrative Patent Judges.  
GROSS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1, 2, and 5 through 15. Claims 2 and 3 have been canceled. Claim 4 is objected to as depending from a rejected base claim.

The appellants' invention relates to a method and apparatus for diagnosing a misfire in a multi-cylinder engine

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<sup>1</sup> Application for patent filed November 29, 1994.

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in which a combustion state parameter is compared to a  
threshold level which

is corrected regularly. Claim 8 is illustrative of the  
claimed invention, and it reads as follows:

8. A combustion state diagnosis apparatus of a multi-cylinder engine to diagnose combustion conditions in a specific cylinder of a plurality of cylinders by measuring revolution speed of the engine for each cylinder, obtaining, as a combustion state parameter, a difference between revolution speed of the specific cylinder and revolution speed of at least one of the other cylinders, and comparing the combustion state parameter with a prescribed threshold level which is a function of at least one of the engine revolution speed and engine load, comprising:

means for correcting said threshold level by a value which is a function of said engine revolution speed.

The prior art references of record relied upon by the  
examiner in rejecting the appealed claims are:

Maddock et al. (Maddock)	5,041,980	Aug.
20, 1991		
Akase	5,307,671	May 03,
1994		

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Claims 1, 2, and 5 through 15 stand rejected under 35 U.S.C. § 103 as being unpatentable over Maddock in view of Akase.<sup>2</sup>

Reference is made to the Examiner's Answer (Paper No. 15, mailed October 7, 1996) and the Supplemental Examiner's Answer (Paper No. 19, mailed April 4, 1997) for the examiner's complete reasoning in support of the rejections, and to the appellants' Brief (Paper No. 14, filed August 26, 1996) for the appellants' arguments thereagainst.

#### OPINION

We have carefully considered the claims, the applied prior art references, and the respective positions articulated by the appellants and the examiner. As a consequence of our review, we will reverse the obviousness rejection of claims 1, 2, 5 through 7, and 9 through 15 and affirm the obviousness rejection of claim 8.

All of the claims except claim 8 recite correcting the threshold level based on the combustion state parameters. In

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<sup>2</sup> In the Examiner's Answer, the examiner withdrew the rejection of claims 1 and 11 under 35 U.S.C. § 112, second paragraph. In the Supplemental Examiner's Answer, the examiner withdrew the rejection of claim 12 under 35 U.S.C. § 112, second paragraph. Therefore, only the rejection of claims 1, 2, and 5 through 15 under 35 U.S.C. § 103 is before us on appeal.

each claim, the phrase "combustion state parameter" is defined in the first paragraph of the claim as "a difference between revolution speed of the specific cylinder and revolution speed of at least one of the other cylinders." Claim 8, on the other hand, recites a means for correcting the threshold level "by a value which is a function of said engine revolution speed."

The examiner states (Final Rejection, page 3) that "Maddock et al. suggest the limitations of claim 1, except for correcting the threshold." Appellants likewise assert (Brief, page 10) that Maddock "do[es] not make any provision for correcting the threshold value." Maddock, however, discloses in column 6, lines 14-17, that "the first threshold T1 is empirically determined and, in the preferred embodiment, it is equal to one-half the

magnitude of the deviation average DEVAVG for that engine cycle." Thus, since DEVAVG is calculated and may change for each engine cycle, and since the threshold level is one half of DEVAVG, the threshold level likewise is calculated and may change (or is updated) each engine cycle. Further, DEVAVG is

defined as "the average of the individual deviations DEV(i)" (Maddock, column 5, lines 66-67), DEV(i) is a period deviation "calculated for each engine cylinder in response to a difference between the periods measured for a respective cylinder" (Maddock, column 5, lines 8-11), and "[t]he measured periods and engine speed are inversely related" (Maddock, column 5, lines 17-18). In other words, DEVAVG is a function of the engine speed for a given cycle, and, therefore, the threshold is based on the engine speed for that cycle. Changes in engine speed from engine cycle to engine cycle therefore will result in modifications or corrections of the threshold. Accordingly, claim 8 is met by Maddock, with the application of Akase merely being cumulative. Therefore, we will affirm the rejection of claim 8.

As to the remaining claims, the examiner states (Final Rejection, page 3) that "Akase is an example of a reference suggesting correcting a misfire threshold in response to RPM" and that it would have been obvious "to apply this broad teaching to Maddock et al. in order to gain well-known advantages such as taught by the reference." The examiner further explains (Final Rejection, pages 2-3) that:

Akase suggests changing the threshold as a function (in response to) rpm and load (see the Abstract, for instance). Given that this technique is known in the art, it would have involved only routine skill to change or correct the threshold used in a Maddock-like system, because load and rpm are known to affect the operation of any internal combustion engine, and thereby any measurements . . . made of that engine's operation.

Thus, the examiner apparently turns to Akase for correcting the threshold in response to rpm and load. Although the examiner fails to specifically identify the referenced advantages to provide a motivation for changing or correcting the threshold, since Maddock's threshold is updated each engine cycle in response to the engine speed, no such teaching is necessary.

The examiner comments (Answer, page 2) that Akase's threshold adjustment can be described "as either 'basing a threshold value on a look-up table which is indexed by engine operating parameters such as load and RPM' or, equivalently, as 'correcting the threshold value based on changes in those parameters.'" The examiner concludes (Answer, page 3) that "Akase DOES change the threshold used based on combustion state parameters (such as RPM and load)." We agree that Akase does change the threshold based on RPM and load, but we

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disagree that Akase changes the threshold based on combustion state parameters.

It appears that the examiner has viewed the phrase "combustion state parameters" at the end of claim 1, for example, as any engine parameter such as engine speed or load. However, as indicated above, appellants clearly and specifically define the phrase "combustion state parameter" in the claim as being "a difference between revolution speed of the specific cylinder and revolution speed of at least one of the other cylinders" and not just any engine parameter. Maddock and Akase each correct the threshold based on RPM, but neither Maddock nor Akase discloses basing the change on the combustion state parameters, as defined in appellants' claims. Accordingly, the examiner has failed to address all of the limitations of the claims. Consequently, we cannot sustain the rejection of claims 1, 2, 5 through 7, and 9 through 15.

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CONCLUSION

In summary, the decision of the examiner rejecting claims 1, 2, 5 through 7, and 9 through 15 under 35 U.S.C. § 103 is reversed, and the decision of the examiner rejecting claim 8 under 35 U.S.C. § 103 is affirmed. The decision of the examiner is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

ERROL A. KRASS	)	
Administrative Patent Judge	)	
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	)	
	)	BOARD OF PATENT
JOHN C. MARTIN	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
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ANITA PELLMAN GROSS	)	
Administrative Patent Judge	)	



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